NON-TECHNICAL ITEMS NOT INCLUDED IN REPORT BUT FORWARDED AS ADDED INFORMATION

As the Negotiated Rulemaking Committee progressed with its deliberations, some items of a non-technical nature arose in the course of discussion that were not considered because those items were peripheral to the Committee's primary task. Nevertheless, the information involved in those items is deemed to be of sufficient interest to be forwarded to the Commission as added information. These items are discussed in the Sub-Sections below.

A. INTERNATIONAL AND ITU CONSIDERATIONS

In the course of the Committee's discussions, reference was made to the possible "ripple effect" internationally of some of the actions being proposed in CC Docket No. 92-297 and later discussed in this Report. LMDS can, for most purposes, be regarded as a domestic service within the U.S. However, satellite operations generally have international implications including being dependent upon spectrum derived from the International Table of Frequency Allocations contained in the Radio Regulations of the ITU and upon detailed coordination and notification procedures set forth in the ITU Radio Regulations.

At the time the international allocations of the 27.5-29.5 GHz band were made, "traditional" terrestrial Fixed Services were in the minds of delegates and the assumption was that sharing arrangements with the Fixed Satellite services would be realistic and simple to arrange. The superimposition of "broadband" terrestrial Fixed Services upon this scenario may have unintended "ripple effects."

B. INTERNATIONAL TRADE RAMIFICATIONS

Export by U.S. manufacturers of telecommunications equipment using radio is tied generally to international spectrum allocations as most countries look to the ITU Radio Regulations and its standards bureau for guidance on equipment design. Manufacturers in the U.S. can be most competitive in world markets if they have a domestic base upon which to build their export markets. Technology that is uniquely American can be very successful in world markets.

C. DEFINITION OF FIXED SERVICES

The ITU Radio Regulations define the Fixed Service as "A radiocommunication service between specified fixed points." The FCC has adopted the identical definition in its Rules (See FCC Rules § 2.1). The Commission representatives at the Negotiated Rulemaking Committee stated the multipoint distribution service is deemed a Fixed Service. Re-examination of the ITU and FCC definitions of the Fixed Service may be timely.

D. INTERNATIONAL ALLOCATIONS IN THE 28 GHz BAND FOR SATELLITE BEACON TRANSMISSIONS

The Radio Regulations of the ITU since 1979 have allocated the 27.5-29.5 GHz band to Fixed, Satellite (earth-to-space), and Mobile Services on a co-primary basis. In addition, the Radio Regulations through footnotes 882A, 882B, 882C, and 882D adopted at WARC 1992 provide for additional allocations, viz, (a) 27.500-27.501 GHz to the Fixed Satellite Service (space-to-earth) on a primary basis for beacon transmissions, (b) 27.501 GHz to 29.999 GHz to the Fixed Satellite Service (space-to-earth) on a secondary basis for beacon transmissions, and (c) 27.500-30.00 GHz for feeder links for the Broadcast Satellite Service on a secondary basis. These allocations should not be overlooked in the course of the Commission's rulemaking action in CC Docket No. 92-297.

E. TRADITIONAL FIXED MICROWAVE AND LMDS FIXED MICROWAVE

Reference is made to the Commission's Second Notice of Proposed Rulemaking in CC Docket 92-297 released on February 11, 1994 (at para. 27) where it is stated "Accommodating all proposals would, we believe, result in the availability of maximum communications services possible at the lowest consumer prices possible." Noting this, the representative of the terrestrial fixed microwave interests raised the point of accommodating all types of terrestrial fixed in the 27.5-29.5 GHz band. If it can be achieved, there appears to be no reason not

to do it. In this connection, the Digital Microwave Corporation and Harris Corporation through its Farinon Division submitted a joint statement to the Committee supporting the need for access to the 27.5-29.5 GHz band for point-to-point systems that would be outside of the point-to-point operations encompassed in an LMDS system. The joint statement (which was supported in a Telecommunications Industry Association letter to the Committee) was noted.

In the ensuing discussion recognition was accorded to the fact that two types of terrestrial fixed microwave have evolved, viz, "traditional" fixed microwave as compared to fixed microwave intended to serve as the backbone within an LMDS system and for the interconnection of hubs of those systems. The "traditional" fixed microwave interests pointed out that while under some circumstances a point-to-multipoint system can also provide some point-to-point links, their location, direction, and capacity are in general determined by the point-to-multipoint system they serve. As such, they would be an unlikely substitute for "traditional" point-to-point microwave transmission systems engineered to specific customer requirements.

Several examples were cited in the above-referenced joint statement of point-to-point microwave requirements that could best be met by frequencies in the 27.5-29.5 GHz band employed in independent microwave systems. The representative of the terrestrial fixed microwave interests urged that traditional point-to-point microwave systems, should not be swept entirely

out of the 27.5-29.5 GHz band.

The FCC Facilitator assigned to the Negotiated Rulemaking Committee explained while the views of the "traditional" fixed microwave interests were recognized, the Committee's charter restricted its activity to maximizing co-frequency sharing in the 27.5-29.5 GHz band between LMDS and/or the Fixed Satellite Service (FSS). He went on to explain the Commission is planning to use the Committee's Report as the basis for further Proposed Rulemaking action. He then stated that collateral items such as permitting "traditional" terrestrial microwave services in the 27.5-29.5 GHz band can be addressed in comments on a likely Third Notice of Proposed Rulemaking.

F. CROSS BORDER COORDINATION.

"Spectrum auctions" and "wide area licensing" need to be harmonized with requirements of international cross border coordination, e.g., Canada, Mexico, and Bahamas, and coordination requirements of the ITU Radio Regulations as well as other international agreements in which the U.S. is involved.

G. CONCERN THAT U.S. PLANNING FOR 27.5-29.5 GHz BAND COULD BE GOING DOWN CONFLICTING PATHS

For some time the U.S. has supported use of the 27.5-29.5 GHz band for satellite communications in the course of its participation in international telecommunications meetings and conferences. Also, as a matter of maximizing efficient use of the band, the U.S. has assisted in the development of technical standards and characteristics for sharing the 27.5-29.5 GHz band

between "traditional" terrestrial fixed and fixed satellite services. Appendix 28 of the ITU Radio Regulations, CCIR Recommendation 847, and CCIR Recommendation ITU-R SF 1006 and other similar provisions were developed with U.S. participation. Concurrent with the Commission's proceeding in CC Docket No. 92-297 are on-going U.S. preparations for several ITU technical meetings being held in the weeks and months ahead and for a major World Radio Conference in Geneva in 1995 (WRC-95). Essentially these project from the years of past U.S. efforts in the ITU arena. Discussions in the course of the Negotiated Rulemaking Committee meetings raise concerns as to whether the U.S. actions in the various international telecommunications negotiations, meetings, and conferences now underway or planned harmonize with the actions under consideration in CC Docket No. 92-297.

cej/lrr/r#4/neg.rule

September 28, 1994

STATEMENT ON BEHALF OF HARRIS CORPORATION --
FARINON DIVISION AND DIGITAL MICROWAVE CORPORATION

As the Negotiated Rulemaking Committee has completed its work, this statement is submitted to call attention to the continued requirements for spectrum in the 27.5-29.5 GHz band for the "traditional" terrestrial microwave service. This subject was raised and discussed early in the Committee's proceedings. Pursuant to that discussion, NRMC No. 33 was submitted to the Committee where it was noted. NRMC No. 33 was supported later by a separate submission to the Committee by the Telecommunications Industry Association (TIA).

In the course of the aforementioned discussion, the "Facilitator" deemed NMRC No. 33 and the subject of "traditional" terrestrial microwave as being a collateral issue vis-a-vis the objective stated in the Charter for the Negotiated Rulemaking Committee. Continuing, he stated the matter could be discussed after the principle work of the Committee has been completed, provided there is sufficient time and, in any event, it would be a proper subject for discussion in a later Further Notice of Proposed Rulemaking in CC Docket No. 92-297. Time has run out on further discussion in the Committee hence this statement is being submitted.

On April 19, 1991, Harris-Farinon filed a Petition for Rulemaking with the FCC to adopt a channelization plan for the 27.5-29.5 GHz band and to make the band available for both Part

21 and Part 94 services. The Digital Microwave Corporation filed supporting comments. That petition was filed for two primary purposes, viz, (a) to channelize the 27.5-29.5 GHz band so that manufacturers would have a standard for their products and (b) to respond to requirements of the telecommunications users who were already conscious in 1991 of the approaching saturation of the 18 GHz band and the developing congestion in the 23 GHz band in some metropolitan areas. Since 1991, U.S. manufacturers of microwave equipment have grown to be more dependant than ever on their capability to successfully address the export market.

In Europe and all of Region I, a major portion of the 23 GHz band was allocated for Satellite HDTV broadcasting. Domestically the explosion of cellular and PCS communications clearly dictated an explosion for short-haul fixed microwave links. Further the long time fixed microwave use of the "2 GHz" band became foreclosed when the Commission reallocated the band for mobile satellite communications. It now appears to be only a matter of time before the entire spectrum below 10 GHz will no longer be available for terrestrial fixed communications. In sum, future emphasis and growth of terrestrial fixed microwave will be in the higher frequency bands.

There were also clear signs that a promising export market for terrestrial fixed microwave equipment operating in the 27.5-29.5 GHz band was developing, not only in Europe but also in the Pacific Rim countries. (For example, initial performance specifications and frequency assignment criteria for terrestrial fixed radio equipment operating in the 27.5-29.5 GHz band were

promulgated in Spain in June 1989 and in the U.K. in July 1991.) The Harris-Farinon filing in April 1991 was a logical and timely step. The export of American communications-electronics products was and remains a very high item of interest to the U.S. Government.

Since April 1991 interest in the 27.5-29.5 GHz for terrestrial fixed communications has exploded. European countries are negotiating with U.S. manufacturers to develop terrestrial fixed communications equipments. If the U.S. also permitted the 27.5-29.5 GHz band to be used for "traditional" terrestrial microwave, U.S. manufacturers would have a significant competitive edge.

It is ironic that the Commission put aside the Harris-Farinon petition because there was "no evidence of either manufacturer or subscriber interest in the 28 GHz band for conventional private or common carrier point-to-point use." A principle reason for the Harris-Farinon petition in April 1991 was to channelize the band so that users could know it was available and manufacturers would have a standard to guide the establishment of production lines. At the time Harris-Farinon and the Digital Microwave Corporation had in fact correctly foreseen an international interest for that band which had just recently been channelized in other countries.

Indications are clear that the Commission sees the introduction of LMDS into the 27.5-29.5 GHz band as a means of providing competition to the cable-TV industry. While this view is understandable for the 1990-1991 time frame, much has happened

since then in the field of telecommunications. For one thing, DBS systems are now operational and expanding rapidly thereby providing competition for cable-TV. The explosion of interest in PCS communications has created new demands for supporting fixed microwave communications for which the 27.5-29.5 GHz band would be ideal. Finally, serious attempts are underway to enable the telephone companies to use their lines for the home for delivery of television programming and other video services. Of relevant interest, on September 16, 1994 the Canadian CRTC announced that telephone companies will be permitted to offer a range of voice/data/video telecommunications services to local subscribers. In the USA, several telephone companies have already been authorized by the FCC to construct broadband facilities for carrying voice/data/video to the home. In short, the competition to cable-TV situation has changed from 1991 when the possibility of LMDS entered the picture.

After participating in the Negotiated Rulemaking Committee for nearly two months, Harris-Farinon and Digital Microwave Corporation feel that it was unfortunate that the 27.5-29.5 GHz band was selected for proposed LMDS operations. This band is allocated world-wide for satellite operations and satellite interests have been planning to use that allocation. Concurrently the 27.5-29.5 GHz band was allocated internationally for terrestrial fixed use because such usage could be made compatible with fixed satellite operations. The super imposition of LMDS in this band has the effect of destroying years of planning. To define LMDS as a "fixed" service to get it

qualified for operation in the 27.5-29.5 GHz band stretches the definition of a fixed service unreasonably. (It is interesting that once in awhile in the course of the Negotiated Rulemaking Committee discussions, LMDS was sometimes inadvertently referred to as a "broadcast".)

Having stated the foregoing, Harris-Farinon and Digital Microwave Corporation suggest that the Commission consider the following as a means of resolving the current dilemma with the 27.5-29.5 GHz band:

(a) As a first choice, if LMDS is to materialize in its present analog form, that it be in a band other than 27.5-29.5 GHz.

(b) Failing (a) above reduce the LMDS allocation to a 1000 MHz allocation made up of two 500 MHz blocks specifically 28-28.5 GHz and 29.0-29.5 GHz. (The advent of DBS and the merging of cable and telephoning networks has altered the competition picture.)

(1) Permit "traditional" terrestrial microwave in the 27.5-28.0 and 28.5-29.0 GHz band.

(2) Accommodate FSS in the same bands as (1).

(3) Take advantage of the Suite 12 - Motorola agreement to place MSS Feeder links in the 29.0-29.5 GHz band shared with LMDS.

Before concluding, the Commission is urged to take NMRC No. 33 (referenced in the first paragraph of this statement) into account as it considers the results of the Negotiated Rulemaking Committee. There are bona fide requirements for "traditional" terrestrial fixed communications in the 27.5-29.5 GHz band that operationally do not fit into an LMDS system. There is no reason to exclude entirely the "traditional" terrestrial fixed microwave service from that band.

Finally, and in conclusion, Harris-Farinon and Digital Microwave Corporation commend the Commission staff for their superb work with the Negotiated Rulemaking Committee. Their task was extremely difficult, however, they performed at all times with great patience, understanding, and professionalism.

Respectfully submitted,

DIGITAL MICROWAVE CORPORATION AND
HARRIS CORPORATION - FARINON
DIVISION

By: Leonard R. Raish
Leonard R. Raish

Their attorney and representative
on the Negotiated Rulemaking
Committee

cej/lrr/r#4/dmchf-statement

ADDENDUM
To the Report of the
LMDS/FSS 28 GHz Band Negotiated Rulemaking Committee

Hughes Space and Communications Company
Hughes Communications Galaxy, Inc.

Hughes Communications Galaxy, Inc. ("HCG") and Hughes Space and Communications Company ("HSC," and collectively with HCG, "Hughes") hereby submit this Addendum to the Report to the Federal Communications Commission of the LMDS/FSS 28 GHz Band Negotiated Rulemaking Committee (the "NRMC").[1/]

I. INTRODUCTION

HCG is a leading operator of geostationary orbit satellites and has applied to the Commission for authority to construct and operate the SPACEWAY system, a global network of geostationary orbit satellites in the Fixed Satellite Service ("FSS"), that will utilize the 27.5--30.0 GHz band for uplinks. HSC is a leading manufacturer of geostationary orbit satellites. HSC and HCG have participated in the NRMC.

As elaborated below, in the course of the NRMC, discussions occurred about certain rules and regulatory concepts that may significantly restrict the ability of Hughes and other geostationary orbit ("GSO") satellite operators to use 27.5-29.5 GHz uplinks in the future. This Addendum is provided to assist the Commission as it considers a possible regulatory framework for services in the 27.5--29.5 GHz band.

When the Commission established the NRMC, it sought to have the NRMC develop a means by which "proposed terrestrial and satellite uses can share, on a co-frequency, co-coverage basis, the 28 GHz band." Second Notice of Proposed Rulemaking, CC Docket No. 92-297, FCC 94-12, ¶ 2 (released February 11, 1994).

Despite the best efforts of all of the parties during the 60 days of the NRMC, no solution was found that would allow co-frequency, co-coverage sharing of the 27.5--29.5 GHz band among terrestrial and satellite users.

The NRMC did, however, reach unambiguous conclusions about the severity of the satellite/terrestrial interference problem. The interference threat from satellite earth stations into LMDS receivers is significant, no matter which combination of satellite system and LMDS system is considered. While exhaustive analyses of this issue appear in the

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1/ This Addendum is submitted pursuant to Section 3 of the Negotiated Rulemaking Act, 5 U.S.C. § 566(f) (1994).

record, Hughes provides a very brief explanation of the magnitude of the problem in Section II of this Addendum.

Equally as important are some of the issues that the NRMC did not have a chance to address. In particular, due to timing constraints, the NRMC was not able to address the other half of the problem: whether GSO satellite systems and feeder links for non-geostationary orbit ("Non-GSO") MSS systems also can share the 27.5--29.5 GHz band on a co-frequency basis. The proposals discussed in the NRMC as a possible means for addressing the competing needs of Non-GSO MSS feeder links and LMDS systems have significant implications for whether GSO and Non-GSO satellite systems can share 27.5--29.5 GHz as well. These implications are addressed in Section III of this Addendum.

II. SUMMARY OF SATELLITE/LMDS INTERFERENCE PROBLEMS

A. Satellite into LMDS

In the course on the NRMC, the most difficult issue that the parties faced was how to prevent interference into LMDS receivers from satellite earth stations. Each of the various LMDS and FSS satellite systems (both GSO and Non-GSO) that have been proposed at 27.5--29.5 GHz is based on the ubiquitous deployment throughout the United States of small, easy-to-install transmit/receive terminals. Many of these terminals would be located in residential areas, and, based on the participants' stated business plans, it would be likely that satellite providers and LMDS providers each would target customers in some of the same neighborhoods.

The problem is very simple: a single satellite earth station can create significant interference into a large number of LMDS receivers over a great distance. This problem is exhaustively analyzed in the Report of Working Group 1 (which is attached to the NRMC Report) and at NRMC Document 113, but is summed up in the following table. This table describes the severity of the interference problem that a single LMDS receiver faces when located within 500 feet of a given FSS satellite earth station under clear-sky, line-of-sight conditions.

Summary of Interference Analysis[2/]
FSS Earth Station into LMDS Receiver
500 ft. Separation Distance

LMDS Antenna Lobe	Number of Cases Examined	Number of Cases with Negative Margin	Percent of Cases with Negative Margin
Main Beam (0 degrees)	35	34	97
Sidelobe (45 degrees)	35	26	74
Minimum Backlobe (180) degrees)	35	21	60

In cases where the LMDS receiving antenna cannot avoid pointing toward the FSS earth station (the main beam), unacceptable interference will occur in 97% of the cases. Even in the most favorable orientation, in which the LMDS antenna points directly away from the FSS earth station (the back lobe), unacceptable interference will occur in 60% of the cases. In cases where the LMDS antenna is oriented 45° away from the FSS earth station (the sidelobe), interference will occur in 74% of the cases. If there is more than one FSS station within 500 feet, an even higher percentage of LMDS receivers would suffer unacceptable interference.

The NRMC could not identify any technical solution that would allow ubiquitous LMDS terminals and ubiquitous FSS satellite terminals to share the 27.5--29.5 GHz band on a co-frequency, co-coverage basis.

2/ This table describes the results of Working Group 1's analysis for a typical separation distance of 500 feet under clear-sky line-of-sight, conditions. In the NRMC, 35 cases of FSS satellite into LMDS interference were considered that cover three FSS systems and three LMDS systems. These cases include five different combinations of FSS terminals and data rates, interfering with both LMDS hub-to-subscriber and LMDS subscriber-to-hub links at all orientations (360°) of the LMDS antenna relative to the FSS terminal main lobe. The FSS main lobe was directed at its minimum elevation angle.

B. LMDS Into Satellite

The converse of the satellite earth station into LMDS terminal problem, or course, is the potential for interference from LMDS transmitters into GSO satellites. During the NRMC, parties discussed one method of limiting LMDS interference into GSO satellites: placing limits on LMDS transmission power levels, such as limiting LMDS transmission power in the aggregate over large geographic areas. While this may represent a possible technical solution, Hughes and other members of the NRMC have raised concerns about the enforceability of such power limits.

In particular, Hughes questions whether it will be realistic to expect to be able to accurately identify the specific source of interfering LMDS transmissions in the future. GSO satellite footprints will cover a large number of LMDS markets, each of which may contain a large number of LMDS cells and even larger numbers of LMDS subscriber terminals. All of these will contribute to the aggregate interfering power levels measured at the satellite receiver. For example, a one degree spot beam footprint for SPACEWAY will be approximately 400 miles in diameter. Assuming that LMDS cells average 50 square miles in area, a typical SPACEWAY footprint could contain as many as 2500 LMDS cells. And this footprint could cover in whole or in part over 50 LMDS markets (Basic Trading Areas), each potentially licensed to a different entity.

As illustrated in this example, (i) the projected ubiquity of LMDS terminals, (ii) the proposal to aggregate the transmissions of large numbers of LMDS transmitters in measuring compliance with LMDS power limits, and (iii) the large number of LMDS licensees in a given satellite's coverage area, make practical enforcement of LMDS power limits difficult at best, or perhaps impossible.

NRMC Document No. 34.6 indicates that certain members of Working Group 2 have recognized that this problem also exists with respect to LMDS interference into Non-GSO MSS satellites. See NRMC 34.6 at Section VI. In its discussion of possible LMDS/Non-GSO MSS rules, that report points out:

> A rule concerning the transmission from [LMDS] subscriber units in the satellite frequency band would be unenforceable. As a practical matter, the ultimate responsibility for detection of harmful interference to the satellite would rest with the satellite operator. It would be impossible to track down the source of interference from potentially millions of [LMDS] subscriber transmitters in the antenna footprint of the satellite.

Id. at 9.

This conclusion holds true as well for LMDS interference into GSO satellites. Hughes urges the Commission to address the practicalities of enforcement if the Commission considers placing power limits on the proposed ubiquitous LMDS terminals.

III. IMPACT ON GSO SATELLITES OF PROPOSALS TO COORDINATE LMDS AND NON-GSO MSS FEEDER LINKS

A. Background

When the work program for the NRMC was established in July, the participants acknowledged that a significant issue exists about the ability of GSO satellite systems and Non-GSO satellite systems to operate in the 27.5-29.5 GHz band. However, the participants could not agree on whether studying the extent of that interference issue and possible ways for GSO and Non-GSO satellite systems to coordinate should be part of the proceedings in the NRMC. In particular, certain LMDS interests strongly opposed creating any working groups to address these issues.

The FCC's Designated Federal Official indicated (i) the Commission's position that GSO/Non-GSO issues were secondary to the primary issue to be addressed in the NRMC ---LMDS/satellite interference; and (ii) if the NRMC failed to reach consensus on the primary issue, then GSO/Non-GSO interference would become a primary issue to be addressed by the NRMC. To this end, the work plan for the Committee called for the primary issue in the NRMC to be resolved by August 23, which would have left time to resolve GSO/Non-GSO compatibility issues. Unfortunately, the primary issue was never resolved and the NRMC was not able to address any GSO/Non-GSO interference issues before its charter expired on September 23.

B. Proposed LMDS/MSS Coordination Rules

In the course of the NRMC, various proposals were considered that might allow LMDS and Non-GSO MSS feeder link operators to coordinate their operations in the 27.5--29.5 GHz band. At numerous times, Hughes expressed its concern that these proposals would have significant implications for the use of the 27.5--29.5 GHz band by GSO satellites, and that these implications need to be addressed. These implications never were considered by the NRMC.

On September 6, 1994, representatives of Suite 12 Group and Motorola Satellite Communications, Inc. ("Motorola") suggested a proposal to promote possible coordination between LMDS and Non-GSO MSS feeder links (the "LMDS/MSS Proposal"), which would limit the portion of the 27.5--29.5 GHz band that could be used for Non-GSO MSS feeder links. The LMDS/MSS Proposal called for (i) allowing only the 29.1-29.5 GHz band to be used for Non-GSO MSS feeder links, (ii) requiring LMDS stations operating in the 29.1-29.5 GHz band in certain regions to operate on a secondary status to MSS feeder links, and (iii) banning all LMDS subscriber link transmissions at 29.1-29.5 GHz. The LMDS/MSS Proposal also required that Non-GSO MSS feeder link stations be located in certain prescribed geographic areas.

The LMDS/MSS Proposal formed the basis for discussions in the NRMC about LMDS/Non-GSO MSS feeder link coordination. Some Non-GSO MSS interests expressed concern about certain aspects of the LMDS/MSS Proposal, such as whether Non-GSO MSS feeder links should be restricted to the 29.1--29.5 GHz part of the band, or whether they should be permitted to operate anywhere in the 27.5--29.5 GHz band. Various discussions occurred about whether one or more Non-GSO MSS feeder link licensees should be permitted in a given part of the band, and whether the LMDS/MSS Proposal should be tailored to address only Motorola's needs, or whether it should generally apply to all possible licensees of Non-GSO MSS feeder link earth stations.

C. The Proposed LMDS/MSS Coordination Rules Have Significant Implications for Other Satellite Services

The LMDS/MSS Proposal has significant implications for use of the Ka band by other satellite services. This proposal represents a partial segmentation of the 27.5-29.5 GHz band between LMDS and Non-GSO MSS feeder links: Non-GSO MSS feeder links could operate only at 29.1--29.5 GHz, and LMDS subscriber terminals could not transmit at 29.1--29.5 GHz. But this proposal does not take into account the needs of other satellite systems. Hughes urges the Commission to carefully consider the implications of the LMDS/MSS Proposal for use of 27.5-29.5 GHz band by other satellite services, because these implications were not addressed by the NRMC.

The NRMC never addressed whether GSO satellites and Non-GSO MSS feeder links could share all or part of the 27.5--29.5 GHz band on a co-frequency, co-coverage basis. Nor did the NRMC address whether more than one Non-GSO MSS operator can use common frequencies for feeder links. Accordingly, the NRMC did not examine how rules and recommendations concerning LMDS/MSS feeder link sharing would affect the ability of GSO satellite systems, such as the one proposed by Hughes, also to use all or part of the 27.5--29.5 GHz band.

As the Commission is aware, ITU-R Task Group 4/5 and IWG4 of the FCC's Industry Advisory Committee on WRC-95 have recognized that the possibility of GSO/Non-GSO and Non-GSO/Non-GSO spectrum sharing is complicated by major technical problems that have no simple solution. Whether GSO/Non-GSO or Non-GSO/Non-GSO co-frequency sharing is possible simply has not yet been determined. To the extent that GSO/Non-GSO co-frequency sharing by coordination is not possible, broad use of the 27.5--29.5 GHz band for the feeder links of multiple Non-GSO MSS systems could preclude use of that band by GSO satellites. To the extent that GSO/Non-GSO co-frequency sharing by coordination is possible, requiring the feeder links of more than one Non-GSO MSS system to be located in one or more discrete portions of the 27.5--29.5 GHz band (e.g., 29.1--29.5 GHz) could greatly complicate, or even preclude, GSO/Non-GSO sharing in that same portion of the band.

These points are critical, because 400 MHz of spectrum at 29.1--29.5 GHz has been discussed as a "set aside" for Non-GSO MSS feeder link use. At the outset, it appears that this amount of spectrum is excessive. Motorola is the only Non-GSO MSS proponent who appears to desire feeder links at 27.5--29.5 GHz and it has applied for only 200 MHz. While certain parties have indicated that the remaining 200 MHz of this 400 MHz block could be used for "expansion" by Motorola or by other Non-GSO MSS operators, that need has not been demonstrated. In fact, no other Non-GSO MSS proponent wants feeder links at 27.5--29.5 GHz. And even if there is a need to set aside spectrum for the feeder link requirements of another Non-GSO MSS system or for "expansion", it has not been established whether a contiguous sub-band is needed for all Non-GSO MSS feeder link applications.

Moreover, the NRMC did not explore whether the 29.1--29.5 GHz segment is the optimum part of the band for GSO/Non-GSO sharing to take place. This part of the band is contiguous with the 29.5--30.0 GHz band in which GSO systems already are licensed or are operating, and it therefore presents a logical part of the band for GSO satellite system expansion. In fact, this band represents 40% of the spectrum that Hughes has requested for the U.S. portion of its SPACEWAY global network.

Finally, Motorola claims that the public interest would be served by allowing it to operate Non-GSO MSS feeder links at 29.1--29.3 GHz because Motorola already has started construction of parts of the IRIDIUM system and because Motorola has chosen this band to facilitate international coordination of its feeder links (see NRMC Document Nos. 32, 84). However, any actions that Motorola has taken before Motorola's system is authorized by the Commission surely are at Motorola's own risk and provide no basis whatsoever for determining in what bands Non-GSO MSS feeder links and GSO systems should be authorized.

IV. CONCLUSION

The NRMC clearly concluded that the GSO satellite/LMDS interference matter is a serious problem with no apparent technical solution.

The LMDS/MSS feeder link coordination approaches that the NRMC has considered have significant implications for the GSO satellite industry and the NRMC was unable to provide a forum for addressing these issues. These LMDS/MSS sharing issues are integrally connected to the issue of GSO/Non-GSO satellite sharing and need to be carefully addressed before deciding whether to authorize Non-GSO MSS feeder links in the Ka band.

Hughes urges the Commission to consider these issues as the Commission considers a possible regulatory framework for services in the 27.5--29.5 GHz band.

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Matthew J. Rinaldo
President
Member of Congress
1973 - 1993

INTERNATIONAL
CELLULARVISION
ASSOCIATION

Susan Magnotti
Common Cable Bureau
Federal Communications Commission
Room 6218
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Washington, D.C. 20054

Dear Ms. Magnotti:

As a member of the LMDS Negotiated Rulemaking Committee, I am submitting the enclosed copy of ICVA's Auction Rules for inclusion in the annex of the Committee's Report to the full Commission. This document, I believe, is crucial to the ultimate robust utilization of the 28 GHz as it provides for the auctioning and equitable sharing of the 28 GHz spectrum by the various competing potential users of this valuable public resource.

As you will note, ICVA's Auction Rules enjoy the support of nine members of the LMDS Negotiated Rulemaking Committee who, like ICVA, appreciate the fact that the wisest and most certain way to utilize this spectrum is to deploy both LMDS and Fixed Satellite Services (FSS) through an auctioning plan that will generate enormous revenues for the Federal Treasury. Moreover, the prompt adoption of auction rules for the co-sharing of the 28 GHz will provide each potential licensee the opportunity to demonstrate their genuine commitment to using this spectrum by participating in Spectrum Auctions that were originally mandated by Congress in the Omnibus Budget Act of 1993. ICVA's Auction proposal which has wide- spread support from members of the Committee, provides the Commission a relevant and efficient mechanism whereby the public interest can be advanced on several levels including: maximum use of the 28 GHz spectrum which is largely fallow at present; generation of enormous spectrum auction revenues for the Federal Treasury; stimulation of professional level and service industry jobs from the development of the LMDS industry both at home and abroad; the availability of an inexpensive and efficient LMDS system providing universal access to the Information Superhighway; promotion of small business' and minority and female ownership of LMDS systems throughout the United States.

As a former member of Congress who is intimately familiar with the congressional intent that has shaped communications policy in the United States for the past two decades, including the congressional mandate for spectrum auctions, I am confident that ICVA's Spectrum Auction Rules for the 28 GHZ will enjoy strong and pervasive support from incumbent members of the United States Congress. Therefore, I urge the Commission to promptly conclude the LMDS Rulemaking with the adoption of the Spectrum Auction Rules which are attached as they will certainly advance these important public goals inherent in the rapid and robust use of the 28 GHz Spectrum.

Sincerely,

Matthew J. Rinaldo

NRMC/91 (Rev.1)
September 22, 1994

Use of Spectrum Auctions for the 27.5-29.5 GHz Band

By Matthew J. Rinaldo and Jeffrey A. Krauss
International CellularVision Association

Introduction

The 27.5-29.5 GHz ("28 GHz") band has been proposed for use by the terrestrial Local Multipoint Distribution Service (LMDS), by satellite earth stations in the Fixed Satellite Service (FSS), and by feeder link earth stations in the Mobile Satellite Service (MSS). Absent detailed and complex regulations, these uses could be incompatible with one another and could cause interference with one another. Use of auctions for this band on an intra-service basis would be a practical alternative that would result in frequency sharing based on private business agreements among the users, rather than detailed regulations. Auctions would also fulfill the public interest benefits intended by Congress in enacting the Omnibus Budget Act of 1993.

The Commission has proposed to license this band for LMDS use based on Rand McNally Basic Trading Areas (BTAs). There would be two 1000 MHz LMDS licenses awarded per BTA. Based on the substantial interest expressed by potential LMDS operators, it would be expected that in most BTAs the two LMDS licenses would be awarded by auction.

However, as discussed more fully below, auctions may also be used to administer the sharing of this spectrum between and among the terrestrial and satellite system proponents. The obvious public interest benefits from auctions would be enhanced by the robust use of the largely unused 28 GHz spectrum.

Interference Issues

The 28 GHz band is allocated for satellite uplinks and for fixed terrestrial links. Consequently, the potential interference models are from satellite earth station transmitters into LMDS receivers, and from LMDS transmitters into receivers onboard satellites in orbit. Calculations done in the working groups of the Commission's 28 GHz/FSS Negotiated Rulemaking Committee (NRMC) have shown generally that the most severe cases of interference would occur in the first case (satellite earth stations into LMDS receivers). In the second case (LMDS transmitters into satellite receivers), interference can generally be controlled by means of limits on the aggregate power emitted by LMDS transmitters. However, the members of the NRMC have not reached a consensus on an appropriate means for controlling interference from satellite earth stations into LMDS receivers.

Private Agreements and Subleasing of Spectrum

Rather than imposing these sharing methods in Commission rules, intra-service auctions will allow satellite and LMDS operators to reach private agreements driven by marketplace realities on the most efficient methods to use the 28 GHz band. Moreover, private agreements are more likely to be able to accommodate new methods and technologies.

The Commission should auction the 27.5-28.5 GHz and 28.5-29.5 GHz bands, and should allow both LMDS operators and satellite operators, or joint ventures between such entities, to bid for licenses. It should also provide for the winners to sublease capacity to other users, both satellite and LMDS operators.

Subleasing of capacity involves a private business arrangement between the successful bidder and another entity, with the successful bidder retaining the legal obligation to comply with FCC technical rules.

Such private business arrangements are already quite common. For example, broadcasters often arrange with portable microwave video services to operate under the broadcasters' licenses for electronic newsgathering. The broadcaster, as licensee, retains the obligation to assure that the microwave operator complies with applicable regulations. ITFS licensees are explicitly permitted to lease spectrum to MMDS operators. See Section 74.931 of the Commission's rules. Similarly, satellite operators are permitted to sell (or lease) transponders. The satellite operator, as licensee of the satellite radio station, retains the FCC compliance obligation, even though it has sold the spectrum associated with that transponder to another entity.

Subleasing of 28 GHz spectrum would undoubtedly work this same way. The successful bidder would retain the obligation to assure compliance with applicable technical rules. Compliance obligations could then be imposed contractually by the successful bidder on its sublessees.

Types of Earth Stations

Three distinct types of earth stations have been identified as potential users of the 27.5-29.5 GHz band. These are: small antenna stations operating in the Fixed Satellite Service at around 1.5 Mbit/sec and located at customer premises (similar to VSAT stations operating at Ku-band); large antenna stations operating in the Fixed Satellite Service at around 1 Gbit/sec; and feeder link earth stations used as part of Mobile Satellite Service. Spectrum auctions can accommodate all three types of stations.

(1) FSS Small Antenna Earth Stations

The small antenna stations are proposed to be ubiquitous--hundreds of thousands of such stations could be located at customer premises throughout the country. In this regard, they could be similar in distribution to LMDS subscriber stations. Satellite operators wishing to deploy such earth stations would be motivated to bid for those BTAs where their customers are likely to be located. To the extent that a satellite operator acquires a 1000 MHz band license at an auction but does not need to use the entire band for its earth stations, FCC policies should encourage spectrum flexibility and efficiency by allowing a satellite operator to sublease capacity to LMDS operators and/or other satellite operators. If the LMDS operator is the successful bidder, it could sublease capacity for satellite earth stations, to the extent consistent with its business plan.

(2) FSS Large Antenna Earth Stations

The large antenna stations are expected to be relatively few in number (perhaps a few hundred throughout the country). It is practical to coordinate and apply sophisticated mitigation techniques for a relatively few major sites. Consequently, an operator of such large earth stations would likely be able to enter into a business arrangement for spectrum capacity at a few locations with the LMDS operator (if that entity was the successful bidder), or would be able to bid for the spectrum and then sublease capacity to LMDS at locations other than near its earth stations. Moreover, some of these stations may be located in rural areas away from most LMDS receiver sites, or shielded by trees or berms to drastically mitigate interference problems.

(3) MSS Feeder Link Stations

Consideration has also been given to the interference and spectrum sharing problems associated with feeder link earth stations used by low earth orbit Mobile Satellite Service systems. These are typically large antenna earth stations that track satellites that are orbiting across the sky; unlike geostationary satellites, these satellites are constantly in motion with respect to fixed sites on earth. The earth stations may be pointed at much lower elevation angles than those earth stations in the Fixed Satellite Service, and can thereby cause interference to LMDS receivers at much greater distances than FSS earth stations, possibly 30 to 40 miles. Some of these stations might actually consist of two or three sites separated by 30 miles from one another in order to employ spatial diversity to counteract rain fades. On the other hand, there are few of these stations, and for the most part they can be located in rural areas that are remote from LMDS customer sites.

MSS feeder links are "intermediate links" not subject to auctions under existing policies. Nonetheless, MSS feeder link earth station operators seeking to use the 28 GHz band can be accommodated in an auction environment if successful bidders are

required to provide a certain portion of their channel capacity to a limited number of MSS operators.

Special Considerations for Designated Entities

In developing its auction procedures for this band, the Commission should give special consideration to the participation of designated entities (as defined in Section 1.2110 of the Commission's Rules) and non-profit educational institutions. These entities can provide enormous public interest benefits if they are afforded access to LMDS licenses on a reasonable basis.

Conclusion

Spectrum auctions for the 27.5-29.5 GHz bands would serve the public interest by allowing private business agreements to determine the most efficient methods for sharing this band between satellite and LMDS operators. Auctions would promote efficient and intensive use of the spectrum by both services, and would stimulate the employment of more advanced technologies that support spectrum efficiency. Spectrum auctions would also fulfill the important and clear intent of Congress, and ultimately contribute to the public interest beyond the availability of new consumer services competing with incumbent monopolies that would be provided by the vigorous use of the largely unused 28 GHz band.

International CellularVision Association Proposed Rule
Implementation of Competitive Bidding in the 27.5-29.5 GHz Band

Subpart Q of Part 1 of the Commission's Rules is amended as follows:

Section 1.2102 (Eligibility of Applications for Competitive Bidding) is amended by adding the following at the end of Section 1.2102(a):

(8) Local Multipoint Distribution Service
(9) Fixed-Satellite Service earth stations transmitting in the 27.5-29.5 GHz band

A new Section 1.2112 is added as follows:

Section 1.2112 Special Provisions for the 27.5-29.5 GHz Band

(a) Mutually exclusive applications in the Local Multipoint Distribution Service ("LMDS") and the Fixed Satellite Service ("FSS") in the 27.5-29.5 GHz band are subject to competitive bidding. Applications in this band will be accepted only for service areas as defined in Section 24.202 of the Commission's Rules. Applications will be accepted only for the 27.5-28.5 GHz channel (Channel A) and the 28.5-29.5 GHz channel (Channel B).

(a)(1) If an LMDS applicant is a successful bidder, it may sublease portions to different FSS licensees, and may sublease different portions of its channel in areas covered by different LMDS Hub transmissions. In addition, the LMDS licensee in the 28.5-29.5 GHz channel shall be required to provide portions of its channel to Mobile Satellite Service ("MSS") feeder link earth station licensees, as specified in subsection (a)(3) below.

(a)(2) If an FSS applicant is a successful bidder, it may sublease portions of its channel to LMDS operators. In addition, the FSS licensee in the 28.5-29.5 GHz channel shall be required to provide portions of its channel to MSS feeder link earth station licensees, as specified in subsection (a)(3) below.

(a)(3) The 29.1-29.5 GHz band within the 28.5-29.5 GHz channel may also be used for feeder link earth stations in the MSS. Such use will only be permitted within the 100 largest Metropolitan Statistical Areas ("MSAs") as follows:

(i) no feeder link earth station complex may be located in the top eight (8) MSAs, ranked by population, as defined by the Office of Management and Budget as of June 1993, using estimated populations as of December 1992; two (2) complexes may be located in MSAs 9 through 25, one of which must be Phoenix, Arizona (for a complex at Chandler, Arizona); one (1) complex may be located in